(19) Europäisches Patentamt
Europ an Patent Office
Office européen des brevets

(11) Publication number: 0 299 598 A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 88303944.8

(51) Int. Cl.⁴: G09F 3/02 , G09F 3/10

(22) Date of filing: 29.04.88

(30) Priority: 13.07.87 US 72927

(43) Date of publication of application:
18.01.89 Bulletin 89/03

(84) Designated Contracting States:
AT CH DE ES FR GB IT LI

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(54) Clean release product with clean lifting portion.

(57) The present invention provides a clean release laminate construction with a clean lifting edge or corner which facilitates removal of a face sheet (10) from the laminate. A release composition (14) is pattern printed onto a backing sheet (26) prior to lamination with a releasable adhesive (28) so that at least one portion (18) of the face sheet (10) remains free from the laminate construction for easy lifting and removal. The invention also includes a method for the manufacture of such a laminate construction and for the production of a plurality of clean release labels on a continuous web of material.

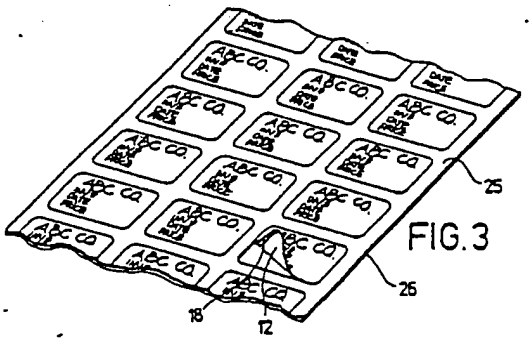


FIG.3

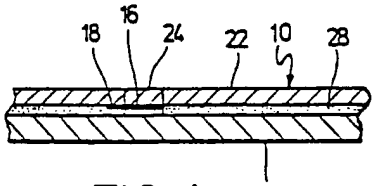


FIG.4

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CLEAN RELEASE PRODUCT WITH CLEAN LIFTING PORTION

This invention relates to a clean release laminate construction, and, more particularly, to a construction having a clean lifting portion for easy detachment of a face sheet from the construction.

Numerous types of businesses produce a wide variety of labels, nameplates, identification cards, tags, forms, and the like in large quantities. Each such product typically has specific indicia printed thereon by high speed printing devices. It is desirable to produce such products on a continuous web, with individual labels or the like being adhesively secured to the web.

One such class of laminated products has been the so-called clean release class of products in which a face or top sheet can be separated from the laminate construction and have a clean and nontacky surface. Such clean release products are used as sew on labels, tags, identification labels, or the like.

Clean release products typically utilize releasable or fugitive adhesives which exhibit cohesive (internal) failure instead of the adhesive/adherend failure exhibited by pressure sensitive adhesives. Releasable adhesives are compositions which form relatively weak bonds, but which adhere well to paper and other surfaces. Failure occurs within the releasable adhesive film itself when a layer of the laminate is subjected to peeling forces.

One problem in the past with such clean release products has been the difficulty in lifting and removing the top layer of the laminate from the remainder of the construction. Because of top sheet or label stiffness or the stiffness of the substrate to which the laminate construction has been secured, there have been problems in the past in effecting separation.

To overcome this separation problem, others have provided label constructions in which an edge of the top or face sheet is not bonded to the base or backing sheet. Rather, the edge is left free to be grasped by a user to begin the delamination of the top sheet from the remainder of the laminate construction.

For example, Dunsirn et al, U.S. Patent No. 4,479,838, describes a coupon structure in which a coupon is secured to a base sheet by means of a fugitive adhesive. The base sheet is, in turn, secured to a release liner by means of a pressure sensitive adhesive. One corner of the coupon is left free of the fugitive adhesive to provide a grasping edge to peel away the coupon. Dunsirn is silent with respect to the method by which the fugitive adhesive is limited to the desired area on the coupon and is not present at the free edge.

Likewise, Hattemer, U.S. Patent No. 4,526,405, discloses a multilayer label structure in which the top label sheet has a fugitive adhesive which secures less than the entire surface area of the label to a base layer therebeneath. The edge of each label is free of adhesive, facilitating removal. The pattern of adhesive is produced by pattern coating of the fugitive adhesive prior to lamination.

However, many commonly used coating procedures are not adaptable to a pattern coating process. Accordingly, the need still exists in the art for a clean release product having a clean lifting edge or corner which is not dependent upon a pattern coating process and which can be produced using a wide variety of coating processes.

The present invention meets that need by providing a clean release laminate construction with a clean lifting portion so that the top or face sheet of the construction can be easily removed. Reference to a "clean lifting portion" in this specification means that some portion of the total surface area of the face sheet is left free of adhesive. This portion may be for example, one or more edges or a corner of the face sheet. Preferably, the clean lifting portion of the face sheet is about the outer periphery of the sheet. The present invention also provides a method by which such a clean release product can be manufactured that does not require the use of pattern coating of an adhesive. The present invention also provides a method for producing a plurality of clean release labels with clean lifting portions on a continuous web of material.

In accordance with one aspect of the present invention, a laminate construction is provided which includes a backing sheet and a face sheet which covers at least a portion of the backing sheet. The backing and face sheet are joined together by a layer of a releasable adhesive which secures a first(lower) surface of the face sheet to a first (upper) surface of the backing sheet. At least one portion on the first surface of the face sheet includes thereon a release composition which does not adhere to the releasable adhesive. This leaves that portion of the face sheet free from the releasable adhesive, thus permitting easy removal of the face sheet from the laminate construction.

In a preferred embodiment of the invention, this release composition is a silicone-based ink which may be printed directly onto the surface of the face sheet. The laminate construction may also be in the form of a piggy-back construction in which a second (lower) surface of the backing sheet has a layer of pressure sensitive adhesive thereon which may be covered with a release liner. This piggy-back construction permits the laminate to be adhered to a substrate with the face sheet in place.

The face sheet can then be removed at a later time as desired.

In an alternative embodiment of the invention, the laminate construction includes a face sheet and a backing sheet as before. In this embodiment, however, the release composition is present on the first (upper) surface of the backing sheet. The pattern of release composition is positioned such that it lies directly beneath a portion of the face sheet such as an edge or corner. Again, that portion of the face sheet is free from the releasable adhesive so that the face sheet can be readily grasped at its free portion and delaminated from the remainder of the construction.

The present invention also includes a method of producing a clean release laminate construction with a clean lifting edge. In one embodiment, a releasable adhesive is applied to a first (upper) surface of a backing sheet. On a separate face sheet, a release composition is printed in a predetermined pattern on a first(lower) surface. Preferably, the pattern is printed along at least one portion of the first surface of the face sheet. The two sheets are then laminated together so that the releasable adhesive secures the face and backing sheets together except along the portion of the face sheet where the release composition was printed.

The release composition is preferably a silicone-based ink which can be printed by conventional flexographic techniques. A piggy-back construction can be made by the further steps of coating the second (lower) surface of the backing sheet with a pressure sensitive adhesive and applying a release liner over the adhesive.

The clean laminate construction of the present invention may also be produced by an alternate procedure. In this embodiment, the release composition is printed in a predetermined pattern onto the first (upper) surface of the backing sheet. The releasable adhesive is then applied over that surface, and the face sheet is laminated thereto. The face sheet is positioned during lamination so that the area printed with release composition is beneath an edge or corner portion of the face sheet. Because of the presence of the release composition, that portion of the face sheet remains free of the backing sheet.

The present invention also provides a method for producing a plurality of clean release labels with clean lifting portions on a continuous web of material. This method is suitable for high speed printing and laminating equipment. At a first station, a releasable adhesive is applied to a first surface of a continuous web of backing material. At a separate location, a pattern of release material is printed onto a first surface of a continuous web of face material. The pattern corresponds to the areas between individual labels and also includes areas which will become respective edge or corner portions of individual labels.

The two webs are then brought together to form the laminate, with the releasable adhesive securing the two webs together. The laminate is passed to a die cutting station where individual labels are cut out of the web of face material. The depth of the cutting operation is controlled so that only the face web is cut, leaving the backing web intact. The matrix portion between individual labels is then removed to produce a plurality of clean release labels with clean lifting edges. Because of the preprinting of areas corresponding to the removed matrix portion with a release composition, removal of the matrix is facilitated, and tearing of the matrix or labels during removal is prevented.

The present invention also provides an alternate method for producing a plurality of clean release labels with clean lifting portions on a continuous web of material. A pattern of release composition is printed on selected areas of a first surface of a continuous web of backing material at a first printing station. The printed web then continues on to a second station where a releasable adhesive is applied to the same surface of the web of backing material.

A continuous web of a face material is then brought into contact with the coated surface of the web of backing material, and the two webs are pressed together to form the laminate construction. The two webs are brought together such that the areas printed with release composition on the backing web lie beneath areas on the face sheet which will correspond to areas between individual labels and respective portions of the labels.

The continuous laminate is then passed through a die cutting operation in which individual labels are cut from the face web. The depth of cut is controlled so that only the face layer is cut. This forms a matrix portion on the face web which corresponds to the areas between the individual labels.

The matrix portion of the face layer is then easily separated from the remainder of the laminate construction because it overlies area where the release composition was printed. This prevents tearing of the matrix and the individuals labels as the matrix is pulled away from the laminate. The individual labels remain with their clean lift portions on the continuous backing web.

Accordingly, it is an object of the present invention to provide a laminate construction in which the face sheet cleanly releases from the backing sheet, its removal facilitated by the presence of a clean lifting portion. It is a further object of the present invention to provide a method for producing such a laminate construction. These, and other

objects and advantages of the invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

In order that the invention may be more readily understood, reference by example will now be made to the accompanying drawings in which:

Fig. 1 is a fragmentary plan view of a typical pattern of printing of the release composition onto a face sheet:

Fig. 2 is a fragmentary plan view of a plurality of clean release labels after die cutting but prior to matrix removal;

Fig. 3 is a fragmentary perspective view of a plurality of clean release labels after matrix removal and with one label partially delaminated from the backing sheet;

Fig.4 is a fragmentary sectional view illustrating a cross-section of the laminate construction; and

Fig. 5 is a fragmentary sectional view illustrating a cross-section of a piggy-back laminate construction.

The present invention is advantageously carried out using continuous webs of face and backing material to produce a continuous series of clean release labels. However, the invention is also applicable to the production of individual sheets of labels or to the production of individual labels themselves. Preferably, the backing material and face material are supplied as continuous rolls as is conventional in the art. The backing and face material are usually paper or paper-like material. However, where it is desired to produce identification cards, nameplates, or the like, the face or backing material may be of thin flexible plastic or a thin metallic foil or metal-coated plastic.

Prior to lamination, either the first lower surface of the face sheet or the first upper surface of the backing sheet is preprinted with a release composition such as a release ink in those areas where it is desired that the releasable adhesive not adhere. The release composition is printed onto the lower face surface or upper backing surface in a conventional manner such as by using flexographic web printing techniques. Many different types of release inks can be used to print the desired pattern. A preferred release ink is a silicone-containing water-based release ink manufactured by the Dow Chemical Company and sold under the designation 3-5024. However, other non-silicone release inks may be used.

Fig. 1 illustrates an embodiment of the invention in which an area of the lower surface 12 of a continuous web of face material 10 has been printed in a desired pattern with a release composition 14. The fragmentary plan view shows a pattern from which a plurality of labels, shown in phantom lines, is formed. As shown, the pattern of printing encompasses both the areas 16 which will form the matrix portion 24 of the laminate and the areas 18 which correspond to the respective edge portions of the labels. Alternatively, the view in Fig. 1 can be seen as a different embodiment of the invention in which the top surface 25 of the backing material 26 is preprinted in the same pattern.

While the drawing figures illustrate that embodiment of the invention where the entire length of one edge of the face sheet is left free of adhesive, it will be apparent that other patterns of release compositions may be printed which will leave additional edge portions free or only one or more corners of the face sheet free of adhesive. All of these embodiments are within the scope of the invention.

The laminate construction may be formed as follows. At a first station, a releasable adhesive 28 is applied over a first top surface 25 of a continuous web of backing material 26. The backing material 26 may be advantageously supplied from a roll. The releasable adhesive 28 may be applied by conventional equipment such as by a roller, a knife blade, or by spray coating. A major advantage of the present invention is that the releasable adhesive does not need to be pattern coated onto the backing material surface. Rather, application is achieved by any number of methods, and the method of application can be optimized for the particular adhesive utilized.

A suitable releasable adhesive may be chosen from blends of polyvinyl acetate and polyethylene emulsions. These blends are formulated by varying the ratio of these two emulsions. Such adhesives are available commercially. The peel strength of these blends may be varied by varying the ratio of polyvinyl acetate to polyethylene.

Suitable physical properties for such a releasable adhesive are: a viscosity of from 3500 to 4500 centipoise at 30 degrees centigrade; a specific gravity of 0.98 to 1.15 grams per cubic centimeter; an oven dry solids content of 43% to 58%; and a pH from 4.5 to 8.5. The adhesive is preferably applied at a rate of from about 3.0 to about 22.0 grams per square meter, and most preferably about 3.0 to about 12.0 grams per square meter, based on dry weight.

The releasable adhesive has a low cohesive strength, bonds well to paper, and is nontacky to the touch when dry. It also provides a uniform nonfiber tearing clean release from paper. Preferred release levels may be in the range of from about 100 to about 500 grams per five centimeters of width, although somewhat higher and lower values are operational. The release test is conducted at 90 degree peel at 1500 centimeters per minute by delaminating the face material from the backing

material. A releasable adhesive suitable for use in the present invention may generally be identified as one in which cohesive failure occurs as a label is peeled from a backing sheet. Cohesive failure is defined as that which occurs within the layer of adhesive, rather than failure at the interface between the face material and adhesive, or the backing material and adhesive. However, adhesives which fail adhesively at either the adhesive-free material interface or the adhesive-backing material interface are also within the scope of the invention.

At a separate station, a pattern of release ink is printed onto a first lower surface of a continuous roll or web of face material. The pattern corresponds to the areas between individual labels and also includes those areas which will become respective edge portions of individual labels. That pattern is illustrated in Fig. 1 and identified by areas 16 and 18.

The two webs are then brought together, such as between the nip of two pressure rolls, and the laminate is formed. Indicia, such as indicia 20, may be printed onto the top surface of face material 10 as illustrated in Fig.2. This printing may be accomplished either prior to or after the face and backing material have been combined into the laminate construction. For purposes of illustration only, the indicia shown relate to an ABC Co. label which may be printed to show an inventory or item number, a date, and a price. Those skilled in the art will immediately recognize that other printed indicia may be used depending upon the specific desired end use of the laminate construction.

As mentioned previously, in an alternative embodiment of the invention, the upper surface 25 of backing material 26 may be preprinted with release composition 14. Thus, the construction illustrated in Fig. 1 may also be viewed as a fragmentary view looking down on that upper surface 25 of backing material 26. In this embodiment of the invention, the top surface 25 of the preprinted backing material 26 is then coated with releasable adhesive 28 and then laminated to face web 10. In yet another alternative embodiment, the releasable adhesive may be applied to the lower surface of face web 10 and then laminated to the upper surface 25 of backing web 26. In both embodiments, there is no need to pattern coat the adhesive.

The laminate construction is then passed to a die cutting station where individual labels are cut out of the web of face material. Fig. 2 illustrates, in fragmentary form, such a construction after die cutting, but prior to matrix removal. As can be seen, face material 10 contains individual labels 22 separated by a matrix portion 24. The depth of the cutting operation is controlled so that only the face web 10 is cut, leaving the web of backing material 26, as best seen in Fig. 4, intact.

The matrix portion 24 between the individual labels, shown as the area between the two vertical cuts in Fig. 4, is then removed to yield the structure illustrated in Fig. 3. Because release material 14 has been previously printed onto the areas beneath matrix portion 24, removal of the matrix is facilitated, and tearing of the labels and/or laminate construction is prevented. Individual labels 22 may then readily be removed from the laminate construction by lifting each label at its clean release edge portion having release material 18 thereon.

Fig. 5 illustrates a piggy-back construction which also produces a clean release label having a clean lifting edge portion. The piggy-back construction is made by following the initial steps of preprinting with a release material, coating with releasable adhesive, and laminating set forth above.

Then, the lower surface 27 of backing web 26 is coated with a pressure sensitive adhesive 30. The pressure sensitive adhesive may be applied by roll coating, spraying, or other conventional means. A release liner 32 is then laminated to the layer of pressure sensitive adhesive 30 to complete the construction. As best illustrated in Fig. 5, the die cutting operation is controlled for this particular construction to cut through the backing web 26, but not release liner 32. Release liner 32 may be coated with a silicone-based material or other known release agent as is conventional in the art.

Claims

1. A laminate construction comprising a backing sheet (26), a face sheet (10) covering at least a portion of said backing sheet, and a release adhesive (28) securing a first surface (12) of said face sheet to a first surface (25) of said backing sheet, at least one portion (18) of said first surface of said face sheet including a release composition (14) printed thereon such that said at least one portion is free from said releasable adhesive.

2. A laminate construction comprising a backing sheet (26), a face sheet (10) covering at least a portion of said backing sheet, and a releasable adhesive (28) securing a first surface (12) of said face sheet to a first surface (25) of said backing sheet, at least one area on said first surface of said backing sheet beneath at least one portion of said first surface of said face sheet including a release composition (14) printed thereon such that said at least one portion is free from said backing sheet.

3. A laminate construction as claimed in claim 1 or 2, in which said release composition is a silicone-based ink.

4. A laminate construction as claimed in claim 1, 2 or 3, including a layer of a pressure sensitive adhesive (30) on a second surface (27) of said backing sheet.

5. A laminate construction as claimed in any preceding claim, including a release liner (32) overlying said pressure sensitive adhesive layer.

6. A method of producing a clean release laminate construction with a clean lifting edge comprising the steps of:
applying a releasable adhesive (28) to a first surface (25) of a backing sheet (26),
printing a pattern of a release composition (14) on at least one portion (18) of a first surface (12) of a face sheet (10), and
laminating said first surface of said backing sheet to said first surface of said face sheet such that said releasable adhesive secures said two surfaces together except for said at least one portion of said face sheet.

7. A method of producing a clean release laminate construction with a clean lifting portion comprising the steps of:
printing a pattern of a release composition (14) on a selected area of a first surface (25) of a backing sheet (26),
applying a releasable adhesive (28) to said first surface (25) of said backing sheet (26), and
laminating said first surface of said backing sheet to a first surface (12) of a face sheet (10) such that said area on said first surface of said backing sheet printed with said release composition lies beneath at least one portion (18) of said face sheet.

8. A method as claimed in claim 6 or 7, in which said release composition is a silicone-based ink.

9. A method as claimed in claim 6, 7 or 8, including the steps of applying a pressure sensitive adhesive (30) to a release liner (32) and securing the release liner to a second surface (27) of said backing sheet by means of the pressure sensitive adhesive.

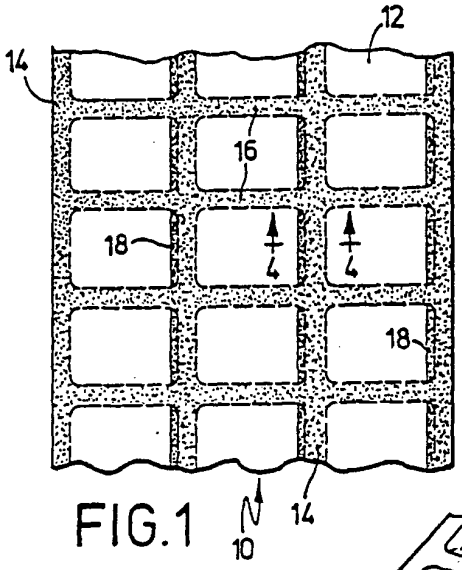


FIG.1

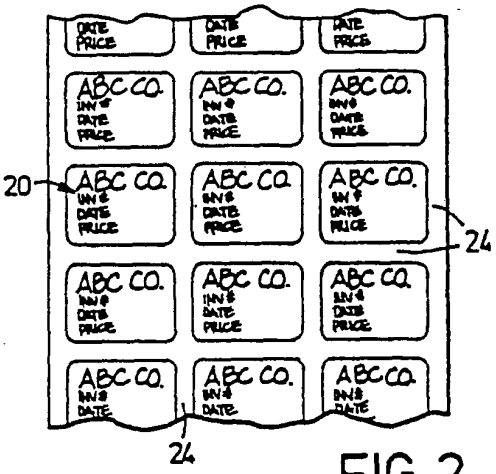


FIG.2

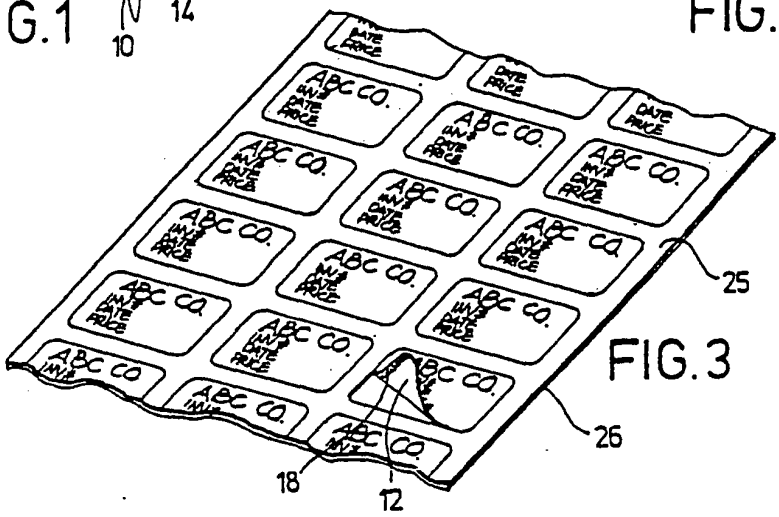


FIG.3

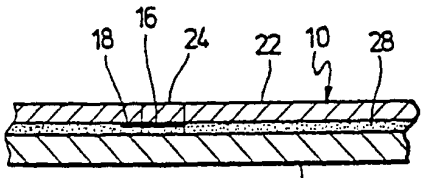


FIG.4

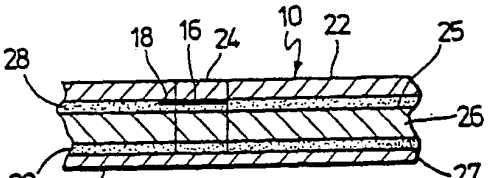


FIG.5